004

CORMIX SESSION REPORT:
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XXXXXXXXXXXX

CORMIX MIXING ZONE EXPERT SYSTEM
CORMIX Version 8.0GTD
DYDRO:Version-5.0.0.0 April,2012

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SITE NAME/LABEL:                        LOOP LLC
  DESIGN CASE:                          Brine Discharge - Info from Sonja
Loyd
  FILE NAME:                            C:\Users\tshaikh\Documents
\Louisiana Permitting\LA0049492\LA0049492 Brine.prd
  Using subsystem BCORMIX2:             Multiport Diffuser Brine
Discharges
  Start of session:                     05/22/2014--09:09:33
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SUMMARY OF INPUT DATA:
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AMBIENT PARAMETERS:
  Cross-section                                  = unbounded
  Average depth                           HA     = 13.72 m
  Depth at discharge                      HD     = 13.72m
  Bottom slope (single slope only)SLOPE   = 0.16 deg
  Ambient velocity                        UA     = 0.09 m/s
  Darcy-Weisbach friction factor          F      = 0.02
  Wind velocity                           UW     = 4 m/s
  Stratification Type                     STRCND = U
  Surface density                         RHOAS  = 1020 kg/m^3
  Bottom density                          RHOAB  = 1020 kg/m^3
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DISCHARGE PARAMETERS:                     Submerged Multiport Diffuser
Discharge
  Diffuser type                           DITYPE = alternating parallel
  Diffuser length                         LD     = 156.97 m
  Nearest bank                                   = left
  Diffuser endpoints                      YB1    = 4828.02 m;     YB2 =
4939.02 m
  Number of openings                      NOPEN  = 26
  Number of Risers                        NRISER = 26
  Ports/Nozzles per Riser                 NPPERR  = 1
  Spacing between risers/openings SPAC   = 6.28 m
  Port/Nozzle diameter                    D0     = 0.1006 m
    with contraction ratio                       = 1
  Equivalent slot width                   B0     = 0.0013 m
  Total area of openings                  TA0    = 0.2066 m^2
  Discharge velocity                      U0     = 2.23 m/s
  Total discharge flowrate                Q0     = 0.460033 m^3/s
  Discharge port height                   H0     = 0.86 m
  Nozzle arrangement                      BETYPE = near vertical
discharge
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  Diffuser alignment angle          GAMMA  = 45 deg
  Vertical discharge angle          THETA  = 90 deg
  Actual Vertical discharge angle THEAC  = 90 deg
  Horizontal discharge angle        SIGMA  = 0 deg
  Relative orientation angle        BETA   = 90 deg
  Discharge density                 RHO0   = 1210 kg/m^3
  Density difference                DRHO   = -190 kg/m^3
  Buoyant acceleration              GP0    = -1.8267 m/s^2
  Discharge concentration           C0     = 100 %
  Surface heat exchange coeff.      KS     = 0 m/s
  Coefficient of decay              KD     = 0 /s
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FLUX VARIABLES PER UNIT DIFFUSER LENGTH:
  Discharge (volume flux)           q0     = 0.002931 m^2/s
  Momentum flux                     m0     = 0.006526 m^3/s^2
  Buoyancy flux                     j0     = -0.005354 m^3/s^3
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DISCHARGE/ENVIRONMENT LENGTH SCALES:
  LQ  = 0.00 m          Lm  = 0.81 m          LM  = 0.21 m
  lm' = 99999 m          Lb' = 99999 m          La  = 99999 m
  (These refer to the actual discharge/environment length
scales.)
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NON-DIMENSIONAL PARAMETERS:
Slot Froude number                FR0    = 45.41
  Port/nozzle Froude number         FRD0   = 5.19
  Velocity ratio                    R      = 24.74
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MIXING ZONE / TOXIC DILUTION ZONE / AREA OF INTEREST PARAMETERS:
  Toxic discharge                          = no
  Water quality standard specified         = no
  Regulatory mixing zone                   = yes
  Regulatory mixing zone specification     = distance
  Regulatory mixing zone value             = 100 m (m^2 if area)
  Region of interest                       = 50000 m
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HYDRODYNAMIC CLASSIFICATION:
  *------------------------*
  | FLOW CLASS   = MNU2 |
  *------------------------*
  This flow configuration applies to a layer corresponding to the
full water
  depth at the discharge site.
  Applicable layer depth = water depth = 13.72 m
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MIXING ZONE EVALUATION (hydrodynamic and regulatory summary):
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X-Y-Z Coordinate system:
  Origin is located at the bottom below the port center:
    4883.52 m from the left bank/shore.
  Number of display steps NSTEP = 40 per module.
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NEAR-FIELD REGION (NFR) CONDITIONS :
Note: The NFR is the zone of strong initial mixing.  It has no
regulatory
  implication.  However, this information may be useful for the
discharge
  designer because the mixing in the NFR is usually sensitive to
the
  discharge design conditions.
  Pollutant concentration at NFR edge   c = 9.8072 %
  Dilution at edge of NFR               s = 10.2
  NFR Location:                         x = 0.82 m
    (centerline coordinates)            y = 0 m
                                        z = -13.72 m
  NFR plume dimensions:  half-width (bh) = 55.78 m
                          thickness (bv) = 0.47 m
Cumulative travel time:       7.6159 sec.
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Buoyancy assessment:
  The effluent density is greater than the surrounding ambient
water
  density at the discharge level.
  Therefore, the effluent is NEGATIVELY BUOYANT and will tend to
sink towards
  the bottom.
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PLUME BANK CONTACT SUMMARY:
  Plume in unbounded section does not contact bank in this
simulation.
************************ TOXIC DILUTION ZONE SUMMARY
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No TDZ was specified for this simulation.
********************** REGULATORY MIXING ZONE SUMMARY
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The plume conditions at the boundary of the specified RMZ are as
follows:
  Pollutant concentration               c = 7.630531  %
  Corresponding dilution                s = 13.1
  Plume location:                       x = 100 m    — chronic
    (centerline coordinates)            y = -0.52 m
                                        z = -13.72 m
  Plume dimensions:      half-width (bh) = 165.12 m
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thickness (bv) = 0.20 m
Cumulative travel time: 1109.606 sec.

Note:
Plume concentration c and dilution s values are reported based on prediction
file values - assuming linear interpolation between predicted points just
before and just after the RMZ boundary has been detected.

Please ensure a small step size is used in the prediction file to account
for this linear interpolation. Step size can be controlled by increasing
(reduces the prediction step size) or decreasing (increases the prediction
step size) the - Output Steps per Module - in CORMIX input.

********************* FINAL DESIGN ADVICE AND COMMENTS **********************

CORMIX2 uses the TWO-DIMENSIONAL SLOT DIFFUSER CONCEPT to represent
the actual three-dimensional diffuser geometry. Thus, it approximates
the details of the merging process of the individual jets from each
port/nozzle.

In the present design, the spacing between adjacent ports/nozzles
(or riser assemblies) is of the order of, or less than, the local
water depth so that the slot diffuser approximation holds well.

Nevertheless, if this is a final design, the user is advised to use a
final CORMIX1 (single port discharge) analysis, with discharge data
for an individual diffuser jet/plume, in order to compare to
the present near-field prediction.

REMINDER: The user must take note that HYDRODYNAMIC MODELING by any known
technique is NOT AN EXACT SCIENCE.

Extensive comparison with field and laboratory data has shown that the
CORMIX predictions on dilutions and concentrations (with associated
plume geometries) are reliable for the majority of cases and are accurate
to within about +-50% (standard deviation).

As a further safeguard, CORMIX will not give predictions whenever it judges the design configuration as highly complex and uncertain for prediction.